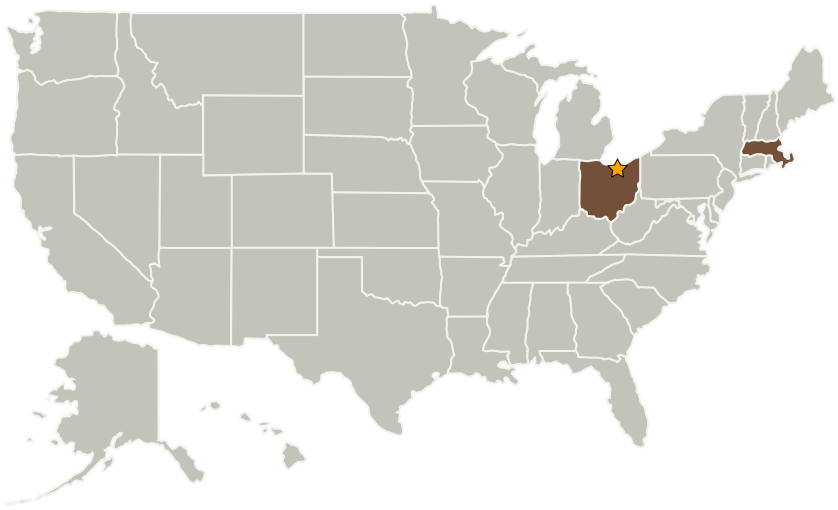
An Ultra-Sensitive, Size Resolved Particle Mass Measurement Device, Phase II

Completed Technology Project (2009 - 2012)

Project Introduction

By providing size resolved compositional information, the Aerosol Mass Spectrometer (AMS) has greatly advanced understanding of aircraft particulate matter (PM) emissions. AMS data have been critical to much of our understanding of aircraft PM emissions, but in the past it has had limited utility in probing the smallest (<100 nm) particles in the exhaust. Also, prior to this work the AMS has been able to detect only volatile PM and other instruments have been required to characterize the non-volatile (soot). During Phase I, we: 1) developed an improved computational fluid dynamic (CFD) model to simulate the performance of the AMS for <100 particles; 2) used the CFD model to invent a new AMS technology with improved performance for <100 nm particles; and 3) evaluated a newly developed instrument which combines a laser vaporization system with a standard AMS to provide size resolved mass and composition data for soot. During Phase II we propose: 1) upgrade our CFD modeling capability to three-dimensions to evaluate Brownian motion and the effects of fabrication imperfections; 2) fabricate and test the promising lens geometry invented during Phase I; 3) demonstrate the laser vaporization AMS and improved lens design(s) in the laboratory and in the field.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Aerodyne Research, Inc	Supporting Organization	Industry	Billerica, Massachusetts

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

December 2009: Project Start

June 2012: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.5 Radiation
    - TX06.5.4 Space Weather Prediction